

UNIT 3

Data Manipulation

Recommended Prior Knowledge

It is important that students understand the importance of structuring databases in the most efficient manner possible, using the correct data types and key fields. In preparation for this module you could teach the use of Boolean logic to search for data, perhaps using a manual card index system. They will also require a basic knowledge of data protection issues and the appropriate legislation affecting their country, along with common data protection principles applied in the majority of countries (see theory section 4k).

Context

This unit can be studied on its own or in conjunction with other practical units. It is recommended that theory Unit 5 (data types) and section 4k (confidentiality of data) is studied before or in conjunction with this unit. Prior to commencing this unit it is recommended that the centre prepares one (or more) data files which should be about 100 records in length with 5-8 fields, and should contain different types of data (numeric, alpha, date, etc.).

Outline

This unit covers the following areas:

The use of database software to:

- accurately enter data
- load/open stored data
- import data
- define database record structures
- format fields
- sort data (alphabetical/numeric, ascending/descending)
- select data by specified criteria (AND/OR/NOT)
- use arithmetic operations / numeric functions to perform calculations
- save data for use in text-based document
- produce reports with specified fields, titles and layout
- export a report for use in another package
- produce graphs and charts with specified data series
- label and manipulate graphs and charts
- print reports.

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
6.1	Load data from existing files and define data structures	<p>Specified files are loaded/opened into a database package.</p> <p>Specified files of different file types are located and imported into the database package with file types like: .csv, .txt, .rtf.</p> <p>Database record structures are defined by assigning field/data types like: text, numeric, integer, decimal, currency, percentage, date/time, Boolean/logical (yes/no, true/false).</p> <p>Define fields using meaningful field names</p> <p>Field sub-types are formatted, for example; a specified currency must be used, or a particular number of decimal places assigned to the field.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> • prepare files of about 100 records with 5-8 fields, with a variety of data structures to be opened, loaded or imported • prepare files with a variety of data structures for the students to load and amend • prepare source documents from which the students will extract data for entry • provide instructions showing what the students have to do.
6.2	Enter data	<p>Stress the need for 100% accuracy in data entry.</p> <p>Prepared exercises in text and numeric data entry.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> • prepare databases with a variety of data entry exercises • provide instructions showing what the students have to do.
7.1	Perform calculations on numeric data	<p>Use arithmetic operations/numeric functions to perform calculations using; calculated fields which are calculated at run time, calculated controls (within reports) which are calculated at run time.</p> <p>Calculations should include basic mathematical operators (addition, subtraction, multiplication, division), as well as functions such as sum, average, maximum, minimum and counting.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> • prepare databases with a variety of calculation to enable practice using all the required operators, formulae and functions • provide instructions showing what the students have to do.
8.1	Sort the data	<p>Teach sorting that database in its original (table) format and sorting the database at run time (within a report).</p> <p>Examples of sorting should be carried out on all field types and be in both ascending and descending order.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> • prepare databases with a variety of data types, to enable a variety of sorting exercises, at table level and in report generation • provide instructions showing what the students have to do.

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
8.2	Interrogate (search) the database to select subsets of data	<p>Search using the logical operators for LIKE, is equal to, is not equal to, less than, greater than, greater than or equal to and less than or equal to.</p> <p>Introduce Boolean logic, AND, OR and NOT and use these as a basis for search techniques.</p> <p>Introduce the concept of Wildcard searches to find items starting with, ending with, or containing.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> prepare databases with a variety of data types, to enable a variety of search techniques provide instructions showing what the students have to do.
9.1	Produce a report	<p>Design the report prior to creation, identifying the fields required and report layout. Design different forms of report, A4 printouts, label production, etc.</p> <p>Display fields as required by the report design. Edit the report to match the design by aligning data as specified (left, centred, right) and displaying fields in a specified format (percentage, currency (various), decimal, specified number of decimal places, integer). Hide or reveal data and labels, show hidden fields, display calculations/formulae, display data/labels in full by resizing fields or controls.</p> <p>Develop the use of screen shots to demonstrate features of the software not easily evidenced.</p> <p>Add text to reports in the form of titles, name, centre number, etc.</p> <p>Use the full features of the report layout, like headers and footers and page layout to match the design of the report.</p> <p>Teach data exporting in the form of a query or report so that it can be imported into another type of applications package. Common export types include .csv, .txt, .rtf</p> <p>Export data into a graph/charting package for further manipulation</p>	<p>Exercise 12</p> <p>Exercise 13</p>	<p>Tutor preparation required:</p> <ul style="list-style-type: none"> prepare databases with a variety of data types, to enable variety in report generation provide instructions showing what the students have to do.

Section	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
9.2	Produce a graph or chart	<p>Understand the different types of graph and chart available within your software package and identify the role of each type and the data that is can meaningfully present.</p> <p>Use the exported data from practical Unit 9.1 to generate an appropriate graph or chart.</p> <p>Teach the selection of only the required data in order to create a chart, including contiguous and non-contiguous data, as well as data within specified ranges.</p> <p>Develop skills in labelling charts with titles, legends, segment labels, segment values, percentages, category axis labels, value axis labels, scales set, axis scale maximum, set axis scale minimum.</p>		<p>Tutor preparation required:</p> <ul style="list-style-type: none"> • prepare sample exported data files • provide instructions showing what the students have to do.

Unit 3 Exercises

EXERCISE 12

Create a new database and import the file TESTSALE.CSV into the following fields:

<i>FNAME</i>	First name (Text)
<i>SNAME</i>	Surname (Family name) (Text)
<i>AGE</i>	Age of the salesperson (Numeric - Integer)
<i>SEX</i>	Gender of the salesperson (Single character text field M or F)
<i>COST</i>	Cost of items sold (Alphanumeric)
<i>SOLD</i>	Number of items sold during this period (Numeric - Integer)

Select all the people older than 30. Within your query add a calculated field called **TOTAL** which is the *COST* multiplied by *SOLD*

Produce a report based on this query which counts the number of people in the report, calculates the maximum, minimum and average cost. Sort this report in ascending order of age. Save the database and print this report.

EXERCISE 13

Using the database that you saved in Exercise 12, select all the products that cost £1.24 or £1.32. Sort this information in order of *SNAME* then *FNAME*. Produce a report on this data that has the title **Products costing £1.24 or £1.32 grouped by age**, and is grouped by *AGE*.

EXERCISE 14

1. Load the file **USERLOG.CSV** into your database package

The fields in the database are:

<i>WEEK</i>	Week number (Numeric)
<i>USER</i>	Family name of User (Text)
<i>FIRST_NAME</i>	Personal name of User (Text)
<i>TEL_EXT</i>	Telephone number (Numeric)
<i>USER_ID</i>	Identity number of User (Alphanumeric)
<i>ATTEMPTS</i>	Number of failed attempts to log in (Numeric)
<i>OFFICE</i>	Code for town where User based (Text)

2. Locate the file **VIOLATE.CSV** and add the records to your existing database table.

You will need to add the *WEEK* number which is 36 for these new records.

You will also need to add information to the *OFFICE* field to identify the location of each added *USER* using the following information:

USER
FIRST_NAME
OFFICE

White	Williams	Williams	French	Anderson
John	Colin	John	Julie	Kate
JO	BA	JO	CA	BA
Currie	Hall	Lambert		
Andrew	Jayne	Charles		
PA	PA	CA		

3. Select for *WEEK 35* and *36* only,
the *FIRST_NAME*, *USER*, *TEL_EXT* and *OFFICE* fields in this order, and present the records sorted alphabetically by *USER*.
Save so that it may be included in a text document at a later stage and print this list.

4. Create a report which includes all the records. The report should be sorted by *OFFICE* and should calculate the following summaries:
Total failed log-ins for the period for all *Users* in the *OFFICE*
And **Average** failed log-ins per week for each *OFFICE*
The report should only display the fields:
OFFICE, *USER*, *USER_ID*, *WEEK* and *ATTEMPTS*

5. Save and Print this report.

6. Create a report which includes all the records. The report should be sorted by *USER* and should calculate the following summary:
Total failed log-ins for the period by the *USER*
The report should only display the fields:
USER, *USER_ID*, *WEEK* and *ATTEMPTS*
The Report Title should be **User Error Log**

7. Save this report in a format that will enable you to integrate it into your text document and print a copy of it.